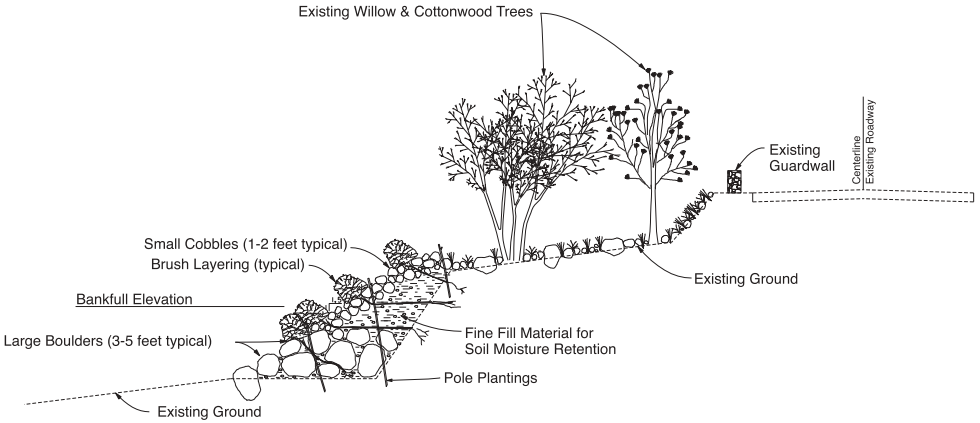
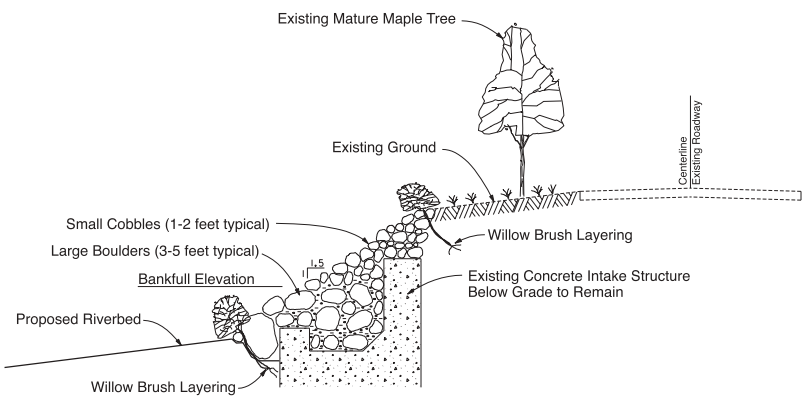
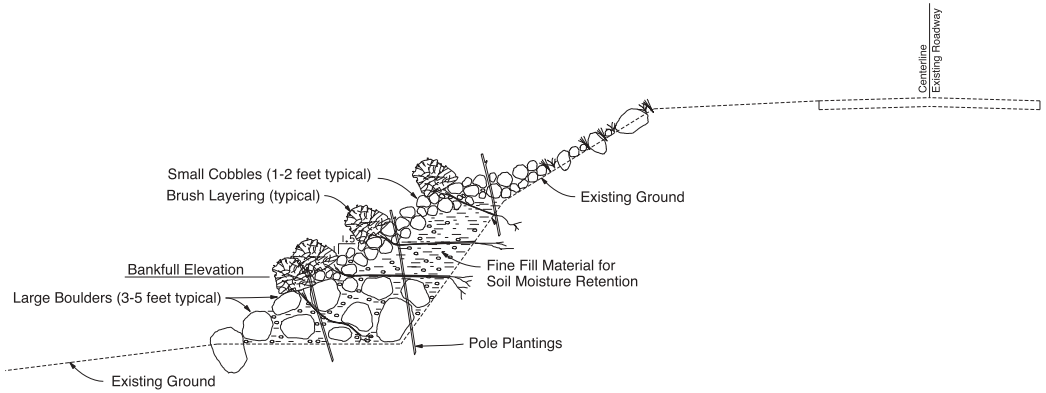
Figure II-5
Bioengineered Slope Protection - Schematic



Bioengineered Slope Protection Upstream of Dam



Bioengineered Slope Protection at Intake Structure
(Alternative 2 Only)



Bioengineered Slope Protection Downstream of Dam

SOURCE: U.S. Department of Transportation, Federal Highway Administration, Central Federal Lands Highway Division 2002; Environmental Science Associates

The project area would be contoured and finished with sediments to facilitate both natural and assisted revegetation by native species that grow in the site-specific conditions present in the Cascades Diversion Dam area. Appropriate planting prescriptions for revegetation have been developed, including appropriate plant species and their placement in relation to Merced River water levels. Species suitable for planting adjacent to the water would include a variety of rush species (such as small-fruited bulrush, sedge, and beaked sedge), intermixed with willows (including sandbar willow, red willow, and arroyo willow). Other species planted in this area may include horsetail, dogbane, and goldenrod. Native grasses would be planted throughout the floodplain. Herbaceous species would be re-established through hand-application of locally acquired mulch from adjacent sites that support these species and hand-application of seeds, minimizing the potential for introduction of non-native species. Seedlings of appropriate species, such as white alder, would be planted within the bioengineered slope at the bankfull mark. Black cottonwood and bigleaf maple cuttings would be planted near the upper limits of the riparian zone to match adjacent riparian vegetation patterns.

The site would be monitored in July (when maximum biomass is present, and to ensure the correct identification of herbaceous species) for five years to determine the success of the revegetation. Based on monitoring results, additional planting or stabilization could be required, including mulching, seeding, and planting of seedlings and cuttings. Any non-native plant species discovered would be removed. Successful revegetation would establish a self-sustaining cover of native species that stabilize soil, trap sediment, provide wildlife habitat, and fulfill other basic functions of riparian ecosystems. The natural regeneration of vegetation would be deemed successful if, after five years, the herbaceous species composition and cover is within 90% of the composition and cover of adjacent native riparian areas, and if the stem density of shrubs and trees is within 90% of natural stem densities of adjacent areas. In addition, monitoring of river-channel morphology, bank conditions, and water quality (turbidity) would continue.

Following revegetation and bank stabilization, all dam-removal-related materials and equipment would be removed from the site. El Portal Road would be realigned to its former location and the paved parking area would be returned to its pre-removal state. In addition, all equipment stored at Pohono Quarry would be removed.

It is assumed that excavated sediment would be used for the site restoration activities described above. However, if excess sediment remains, it would be dried on site at the island upstream of Cascades Diversion Dam and subsequently removed from the site for disposal at an approved and licensed facility or for reuse within the park. Rockfill removed from the dam structure that is free of concrete would be used to support the site restoration activities described above or would remain in the riverbed. Other material removed may be temporarily stored at Pohono Quarry, where materials would be sorted for reuse within the park, recycling, or disposal. Consistent with the National Park Service's *Guiding Principles of Sustainable Design* (1993b), all infrastructure materials removed from the site (e.g., concrete, rock rubble, wood) would be recycled to the extent possible, at an approved and licensed facility, or reused within the park. No metal, concrete, or timber materials would be disposed within the boundaries of Yosemite National Park. All project materials that would not be reused within the park would be removed from Pohono Quarry upon completion of the project.

Once the dam is removed, some portion of the remaining sediment not removed by mechanical means would be transported downstream with riverflows. The channel of the Merced River

would be expected to naturally narrow and deepen as impounded sediments (up to a maximum range of approximately 9,600 to 15,600 cubic yards) wash downstream. As described in Chapter III, Affected Environment, Alluvial Processes, and under the No Action Alternative, sediment and materials were present prior to dam construction, and some of these would likely remain following dam removal. The island located upstream from the dam would likely remain following dam removal and would naturally become vegetated with native riparian species, further stabilizing sediments on the site. Downstream sediment transport and evolution of natural channel dynamics under Alternative 2 would be the same as described under the No Action Alternative, with the following exceptions:

- Up to a maximum range of approximately 9,600 to 15,600 cubic yards of sediment would wash downstream (compared to a maximum range of 15,000 to 20,000 cubic yards of sediment under the No Action Alternative)
- Dam-related debris would not be washed downstream (compared to approximately 5,045 cubic yards of rock, concrete, and timber debris that could be deposited in the river and along the banks to the Cascades Picnic Area under the No Action Alternative)
- Average sediment depositional thickness at Cascades Picnic Area would range from 0.3 to 2.1 feet (compared to 0.4 to 2.7 feet under the No Action Alternative)

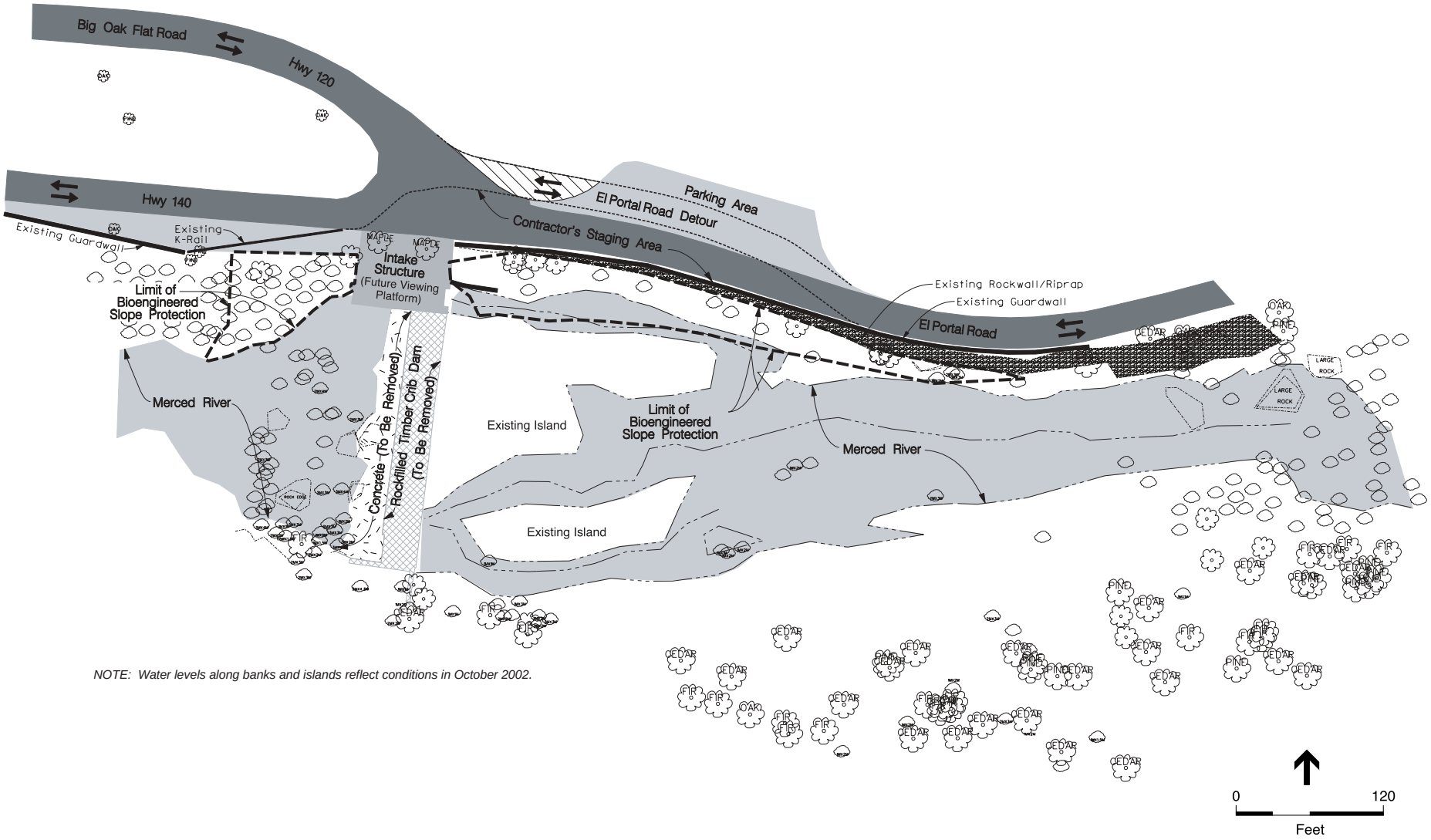
Wild and Scenic River Segment Reclassification

Under the Wild and Scenic Rivers Act, classifications (Wild, Scenic, or Recreational) are applied to each segment of the river corridor based on the existing conditions in that portion of the corridor. The river segment at the dam from the top of the pool to 200 feet below the dam is classified as recreational due to the manmade impoundment at the site. The river segments upstream and downstream of the dam are classified as scenic, a designation reserved for sections of rivers that are "free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads." Upon implementation of Alternative 2, the river segment through the dam site would be restored to a free-flowing state, near natural conditions. It would then be reclassified as scenic, as is called for in the Merced River Plan.

Alternative 3: Partial Dam Removal

Alternative 3 includes complete removal of the dam, the river-left dam abutment, and the screenhouse on the river-right intake structure, and restoration of the related river channel located beneath the dam site (see figure II-6). Under this alternative, the river-right dam abutment and intake structure would be retained for use as a river viewing platform. Approximately 4,400 to 5,400 cubic yards of sediments (including rocks and boulders) in the area upstream of the dam would be excavated and repositioned to stabilize the river-right bank and decrease the potential for sediment erosion. Figure II-4 indicates the river profile at Cascades Diversion Dam before and after removal of the dam structure and sediments. Natural river processes would continue to transport remaining sediments (up to a maximum range of approximately 9,600 to 15,600 cubic yards of sediment) from the impoundment area over time, allowing for a gradual re-establishment of the natural river channel and related riparian habitat. It is expected that the river would fully recover incrementally over time, as sediments are transported from the impoundment area. However, the rate of natural channel recovery and restoration would be monitored to determine if additional restoration actions were necessary. Following removal of the dam and screenhouse, the river-right bank would be stabilized upstream and downstream of the intake structure using a

Figure II-6
Alternative 3 - Partial Dam Removal



NOTE: Water levels along banks and islands reflect conditions in October 2002.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, Central Federal Lands Highway Division 2002; Environmental Science Associates

bioengineered bank stabilization system to prevent erosion of the river-right bank. The objective of this alternative would be to restore the natural river character with a mixture and distribution of boulders, cobbles, gravels, sand, silt, soil, and vegetation similar to those found in adjacent riverbank segments.

In-channel work, bank stabilization, and revegetation would be completed within a two- to three-month period during the fall of 2003 (September through November) when flow of the Merced River is typically lowest (less than 200 cubic feet per second). The overall project duration would be approximately five months. Dam removal would occur in three phases, as follows:

- *Phase 1 – Dam Removal Setup*
  - Detour traffic to the north side of El Portal Road to create a staging area adjacent to the dam site
  - Install interpretive displays within the park
- *Phase 2 – Dam Removal*
  - Draw down impoundment (dewater) using the waste gates in the existing intake structure
  - Install coffer dam to protect the active removal site from riverflows
  - Establish temporary diversion channel crossing bridge near intake structure on the river-right bank
  - Partially excavate impounded sediment near upstream face of dam
  - Demolish timber overflow section of dam using large excavator on workpad
  - Remove the river-left abutment concrete structure
  - Excavate pilot channel upstream of sluiceway through sediment to river channel
  - Divert riverflow through pilot channel and remove diversion channel crossing
  - Remove remainder of dam and screenhouse
  - Install concrete apron over the top of the intake structure and install a safety railing to create river-viewing platform
  - Install interpretive displays within the project area
  - Install sidewalk and curbing between vehicle turnout and the river-viewing platform
- *Phase 3 – Site Restoration and Cleanup*
  - Reconfigure excavated sediments along river-right bank for bioengineered bank stabilization system
  - Install bioengineered bank stabilization system using native river rock and vegetation; match biological, visual, and structural characteristics of the upstream and downstream riverbanks
  - Demobilize equipment and remove traffic detour and contractor use area
  - Remove and revegetate the former parking area

Total estimated excavation volumes for Alternative 3 include:

- *Impounded Sediments*[3] – 4,400 to 5,400 cubic yards
- *Rock, Concrete, and Timber* – 5,050 cubic yards

[3] All 4,400 to 5,400 cubic yards of impounded sediment would be reconfigured on the river-right bank to facilitate restoration and revegetation.

It is estimated that approximately 255 loaded truck trips[4] would be required to remove excavated materials under Alternative 3. In addition, project activities would generate additional truck trips between the dam and a secondary project staging and storage area at Pohono Quarry. The number of daily truck trips between the dam and the quarry would vary and is expected to be infrequent during most project activities, but could be as high as 20 trips per day during some project activities, such as during removal of timbers and rockfill. The total estimated cost to implement Alternative 3 is between $2 and $2.6 million.

Description of Dam Removal Activities

Phase 1 – Dam Removal Setup

Dam removal setup under Alternative 3 would be the same as described under Alternative 2.

Phase 2 – Dam Removal

Dam removal activities under Alternative 3 would be the same as described under Alternative 2, with the exception of activities at the river-right dam abutment and intake structure. Following redirection of the riverflow away from the river-right bank and into a newly excavated pilot channel (see description of dam removal activities under Alternative 2), removal of the remainder of the dam (approximately 40%) and screenhouse would begin (see photo). In-river activities and mechanical equipment would include individual operators for the two waste gates and for the penstock slide gate, a traveling fish screen, and a trashrack.

Under Alternative 3, the screenhouse would be removed and the river-right abutment and intake structure would be retained as a viewing platform.

The river-right dam abutment and the intake structure would be retained as a viewing platform by covering the structure with a 6-inch reinforced-concrete pad and installing approximately 75 linear feet of handrail around the perimeter of the intake deck. Exhibits documenting the history of the dam and its relationship to park history would be installed in the river-viewing platform area. In addition, a 5-foot-wide sidewalk would be installed between the vehicle turnout to the west and the viewing platform, with concrete curbing installed between El Portal Road and the sidewalk.

[4] Assuming a truck capacity of 20 cubic yards. The number of truck trips includes round-trip travel to and from the work site.

Phase 3 – Site Restoration and Cleanup

Site restoration, cleanup, downstream sediment transport, and evolution of natural channel dynamics under Alternative 3 would be the same as described under Alternative 2. Bank stabilization along the river-right, upstream and downstream of the intake structure, would be required under Alternative 3, as the retained dam abutment and intake structure would not provide bank protection from erosion as the Merced River returns to more natural conditions upstream and downstream of the structure. See the description of bank stabilization under Alternative 2.

Following revegetation, bank stabilization, and realignment of El Portal Road to its former location, the paved parking area, public telephone, and trash cans north of El Portal Road would be removed. The existing parking lot would be contoured to create a variety of microhabitats and would be revegetated with a combination of upland tree and shrub species, primarily canyon live oak, California black oak, ponderosa pine, and Mariposa manzanita. Drier-site riparian species, including California bay-laurel and black cottonwood, would also be used. The tree and shrub species would be planted as seedlings in densities representative of nearby areas with similar slope and aspect characteristics. Herbaceous species, including native lupines, lotus, California fushia, and grasses, would be seeded onto the site following contouring. Native forest litter and duff from adjacent areas would be applied to the site to protect seeds from predation and to minimize soil moisture loss as seedlings become established. Further seeding, mulching, and planting could be required as the result of site monitoring, which would occur for five years to determine the success of the revegetation. Success of this revegetation would be evaluated in conjunction with the river-right bank stabilization and revegetation. Visitor parking in the El Portal Road/Big Oak Flat Road intersection area would be restricted to the turnout to the west of the intersection, along the river-right bank.

Wild and Scenic River Segment Reclassification

Under the Wild and Scenic Rivers Act, classifications (Wild, Scenic, or Recreational) are applied to each segment of the river corridor based on the existing conditions in that portion of the corridor. The river segment at the dam from the top of the pool to 200 feet below the dam is classified as recreational due to the manmade impoundment at the site. The river segments upstream and downstream of the dam are classified as scenic, a designation reserved for sections of rivers that are “free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.” Upon implementation of Alternative 3, the river segment through the dam site would be restored to a free-flowing state, near natural conditions. It would then be reclassified as scenic as is called for in the Merced River Plan.

Alternatives Considered but Dismissed

The following alternatives are not addressed in the Cascades Diversion Dam Removal Project Environmental Assessment for one or more of the following reasons:

- The alternative does not meet the project’s Purpose and Need
- Less environmentally damaging or less expensive options are available
- The alternative would cause unacceptable environmental, cultural, or social impacts

- The alternative conflicts with the guidance and direction provided in the Merced River Plan (NPS 2001a)
- The alternative conflicts with the guidance and direction provided in the *Yosemite Valley Plan* (NPS 2000a)

Remove Cascades Diversion Dam and Complete Sediment Removal

Removal of the Cascades Diversion Dam in conjunction with complete removal of the 15,000 to 20,000 cubic yards of sediment in the upstream impoundment would remove sediments that were present prior to construction of the dam in 1917. As described in Chapter IV, Environmental Consequences, Alluvial Processes, a rock and sediment island already existed immediately upstream of the dam prior to construction. The quantity of sediment present prior to dam construction is not known. Removal of sediment present prior to dam construction would not result in the re-establishment of a near-natural river channel and related riparian habitat. In addition, this alternative would require 700 to 750 truck trips to remove dam materials and sediment and would entail a project duration of seven months. This would result in greater impacts to air quality, traffic and access, and recreation-related experience than the action alternatives considered in this environmental assessment.

Restore Cascades Diversion Dam and Hydroelectric Generating Facility

Repair of Cascades Diversion Dam and the entire hydroelectric generating facility to fully functioning capacity would require complete removal and reconstruction of the dam overflow structure; reconstruction of approximately one mile of penstock, which would need to be installed under El Portal Road (Highway 140); reconstruction of the tailrace (or outlet channel); and purchase and installation of new generating equipment in the powerhouse.

Removal of the dam overflow structure would occur as described under Alternative 2 above. The new overflow structure could utilize a system of lightweight galvanized steel members bolted together in a series of adjoining closed-face bins backfilled with native gravel and cobble materials. Although this alternative would alleviate the high-hazard condition of the dam, consistent with the project's Need, it is inconsistent with the Purpose of the project to remove an unnatural obstruction on the Merced River and to restore the river's free-flowing condition, consistent with the Merced River Plan (NPS 2001a) and *Yosemite Valley Plan* (NPS 2000a).

Replace Cascades Diversion Dam with Boulders

This option would require complete removal of the dam overflow structure and installation of large boulders at the current dam site to impound water and limit downstream sediment transport. This option would perpetuate unnatural conditions at the site, limiting free flow of the Merced River and other natural processes. Similar to the above scenario, this option is inconsistent with the purpose of the project.

Remove Portions of the Dam Over Time

This option would remove the dam overflow structure, abutments, and the intake structure in phases over a series of years, ultimately resulting in complete removal of all structures and impounded sediments. Although this option meets the purpose of the project, it has potential to create substantial environmental effects. Phased removal of the dam over a period of years would

expand removal-related impacts. For example, transportation- and recreation-related effects of removal would last years instead of one season. Removing only a portion of the dam's overflow structure in the first season could destabilize remaining structures and could result in uncontrolled failure. Uncontrolled failure of the remaining structures would have downstream impacts on resources and free flow of the Merced River and has potential to adversely affect park facilities, recreational uses, and visitors, similar to the No Action Alternative. Therefore, this alternative would not be consistent with the Need for this project.

Combine the Removal of Cascades Diversion Dam with the Final Phase of the El Portal Road Improvement Project

The National Park Service intends to remove Cascades Diversion Dam, let natural processes prevail through this reach of the Merced River, and allow the river to stabilize. If the National Park Service decides to proceed with the El Portal Road Improvement Project – Cascades Dam to Pohono Bridge, potential future designs will need to comply with the Wild and Scenic Rivers Act as well as other legislation and park planning documents. Although the Cascades Diversion Dam Removal Project is completely distinct from the El Portal Road Improvement Project, the road improvement project is included in the cumulative impact analysis in this document because it is a reasonably foreseeable project that the National Park Service may decide to pursue (see Appendix E, Projects Included in the Cumulative Impact Analysis).

Mitigation Measures Common to All Action Alternatives

To ensure that implementation of the proposed action protects natural, cultural, and social resources and the free-flowing condition of the Merced River corridor, a consistent set of mitigation measures would be applied during project implementation to avoid, minimize, and mitigate adverse impacts.

Sustainable Design and Aesthetics

The project shall avoid or minimize impacts to natural, cultural, and social resources. The project shall be designed to work in harmony with the surroundings, particularly the Merced River transition between Yosemite Valley and the downstream gorge. The project shall reduce, minimize, or eliminate air and water nonpoint-source pollution. The project shall be sustainable whenever practicable, by recycling or reusing materials, by minimizing materials, and by minimizing energy consumption during the project.

Best Management Practices During Dam Removal

The National Park Service (and its contractors) shall implement the following best management practices, as appropriate, prior to, during, and/or after dam removal. Specific tasks would include, but are not limited to, the following:

- Inspect the project to ensure that impacts stay within the parameters of the project and do not escalate beyond the scope of the environmental assessment, as well as to ensure that the project conforms with the U.S. Army Corps of Engineers Special Site Permit, Cascades Dam Removal (as amended), Merced River Cascades Restoration Report, the Central Valley Regional Water Quality Control Board Waiver of Waste Discharge Requirements and Water

Quality Certification, Cascades Dam Removal, and other applicable permits or project conditions.

- Implement compliance monitoring to ensure the project remains within the parameters of National Environmental Policy Act and National Historic Preservation Act compliance documents, U.S. Army Corps of Engineers Section 404 permits, etc. Compliance monitoring would ensure adherence to mitigation measures and would include reporting protocols.
- Implement natural resource protection measures. Standard measures include demolition scheduling, biological monitoring, erosion and sediment control, use of fencing or other means to protect sensitive resources adjacent to the work area, and revegetation. The measures include specific monitoring by resource specialists as well as treatment and reporting procedures.
- Implement the requirements of the 1999 Programmatic Agreement between the National Park Service, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation for the "Resolution of Adverse Effects" associated with planning construction, operations, and maintenance activities within Yosemite National Park (i.e., review of project design, avoidance of sensitive cultural resource areas, monitoring of project activities as appropriate, ongoing tribal consultation).
- Implement the requirements of the 1999 Agreement between the National Park Service and the American Indian Council or Mariposa County, Inc. for conducting traditional activities.
- Confine work areas within the river channel, such as workpads to support demolition equipment, to the smallest area necessary.
- Limit the amount of rock and sediment required for the river-right bank bioengineereed bank stabilization to the minimum required to stabilize and protect the slope from erosion. Amount shall be determined in consultation with National Park Service resources management staff during final project design.
- Steam-clean heavy equipment prior to its entry into the park to prevent importation of non-native plant species, and repair all petroleum leaks prior to work near the Merced River. Tighten hydraulic hoses and ensure they are in good condition.
- To minimize the possibility of hazardous materials seeping into soil or water, check equipment frequently to identify and repair any leaks, as directed in the spill prevention and countermeasure plan. Standard measures include hazardous materials storage and handling procedures; spill containment, cleanup, and reporting procedures; and limitation of refueling and other hazardous activities to upland/nonsensitive sites. Provide an adequate hydrocarbon spill containment system (e.g., floatable absorption boom, absorption materials, etc.) on site, in case of unexpected spills in the project area. Ensure equipment allowed within the river channel is equipped with a hazardous spill containment kit. Ensure that personnel trained in the use of hazardous spill containment kits are on site at all times during dam removal activities.
- Store all construction equipment within the delineated work limits.
- Implement measures to reduce effects of dam removal on visitor safety and experience. Safeguard visitors, contractors, and park personnel from removal activities. Implement a barrier plan indicating locations and types of barricades to protect public health and safety.
- Provide information about recreational closures and the location, timing, and duration of work activity to visitors as they enter the park. Flag and/or fence off work areas to maintain visitor safety during both work and nonwork hours.
- Implement an interpretation and education program. Continue directional signs and education programs to promote understanding among park visitors.

- Implement a traffic control plan, as warranted. Include strategies to maintain safe and efficient traffic flow during the project work period.
- Ensure an emergency notification program is in place. Standard measures include notification of utilities and emergency response units prior to demolition activities. Identify locations of existing utilities prior to removal activity to prevent damage to utilities, particularly the wastewater lines that pass under El Portal Road within the project area. The Underground Services Alert and National Park Service maintenance staff shall be informed 72 hours prior to any ground disturbance. Demolition shall not proceed until the process of locating existing utilities is completed (wastewater, electric, and telephone lines). An emergency response plan shall be required of the contractor for measures that will be taken during all high-water events during dam removal, such as evacuation of personnel, equipment, and materials from the river, etc.
- Avoid damage to natural surroundings in and around the work limits. Provide temporary barriers to protect existing trees, plants, and root zones, if necessary, as determined by vegetation management staff. Trees and other vegetation shall not be removed, injured, or destroyed without prior written approval. Ropes, cables, or fencing shall not be fastened to trees. All existing resource protection fencing (post and rope) shall be left in place and protected from heavy equipment.
- Remove all tools, equipment, barricades, signs, surplus materials, and rubbish from the project work limits upon project completion. Repair any asphalt surfaces that are damaged due to work on the project to original condition. Remove all debris from the project site, including all visible concrete, timber, and metal pieces. Grade disturbed areas and rake them smooth to eliminate tire tracks and tripping hazards.
- Locate, contain, and stabilize excavated and stored materials within the upland staging areas and prevent re-entry into the river.
- Implement standard noise abatement measures during work. Standard noise abatement measures include the following elements: a schedule that minimizes impacts to adjacent noise-sensitive uses, use of the best available noise control techniques wherever feasible, use of hydraulically or electrically powered impact tools when feasible, and location of stationary noise sources as far from sensitive uses as possible (see Chapter III, Affected Environment, Noise). Ensure all construction equipment is equipped with mufflers kept in proper operating conditions, and, when possible, shut off equipment rather than allowing it to idle.
- If deemed necessary, demolition work on weekends or federal government holidays may be authorized, with prior written approval of the Superintendent. To the extent possible, perform all on-site noisy work above 76 dBA (such as the operation of heavy equipment) between the hours of 8:00 a.m. and 5:00 p.m. to minimize disruption to nearby park users.
- Use silt fences, sedimentation basins, etc. in work areas to reduce erosion, surface scouring, and discharge to water bodies, as defined in the erosion control plan prepared for this project.
- Delineate wetlands and apply protection measures during construction. Wetlands shall be delineated by qualified National Park Service staff or certified wetland specialists and clearly marked prior to work. Perform activities in a cautious manner to prevent damage caused by equipment, erosion, siltation, etc.

Resource-Specific Measures

Hydrology, Floodplains, and Water Quality

- Prepare an erosion control plan specifying measures to prevent erosion/sedimentation problems during project construction. Include a map of the project site delineating where erosion control measures will be applied. Include the following minimum criteria, as listed in the *Guidelines for Protection of Water Quality During Construction and Operation of Small Hydro Projects* (CVRWQCB 1983):
  - Construction equipment shall not be operated in flowing water, except as may be necessary to construct crossings or barriers.
  - Where working areas are adjacent to or encroach on live streams, barriers shall be constructed that are adequate to prevent the discharge of turbid water in excess of specified limits.
  - Material from construction work shall not be deposited where it could be eroded and carried to the stream by surface runoff or high stream flows.
  - All permanent roads shall be surfaced with materials sufficient to maintain a stable road surface.
  - All disturbed soil and fill slopes shall be stabilized in an appropriate manner.
  - Surface drainage facilities shall be designed to transport runoff in a nonerosive manner.
  - Riparian vegetation shall be removed only when absolutely necessary.
  - There shall be no discharge of petroleum products, cement washings, or other construction materials.
  - Erosion control measures shall be in place prior to dam removal and maintained in good repair.
  - Stream diversion structures shall be designed to preclude accumulation of sediment. If this is not feasible, an operation plan shall be developed to prevent adverse downstream effects from sediment discharges.
- Erosion control measures shall be inspected daily during dam removal and monthly following removal, and repaired as required.
- Waters shall be free of changes in turbidity that cause a nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits, as described in *The Water Quality Control Plan* for the Central Valley Regional Water Quality Control Board (CVRWQCB 1998). In determining compliance with the limits below, appropriate averaging periods may be applied, provided that beneficial uses will be fully protected:
  - Where natural turbidity is between 0 and 5 Nephelometric Turbidity Units (NTUs), increases shall not exceed 1 NTU.
  - Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20%.
  - Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs.
  - Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10%.
- Implement stormwater management measures to reduce nonpoint-source pollution discharge. This could include measures such as oil/sediment containment or street sweeping.

- Remove hazardous waste materials generated during implementation of the project from the project site immediately.
- Dispose of volatile wastes and oils in approved containers for removal from the project site to avoid contamination of soils, drainages, and watercourses. Keep absorbent pads, booms, and other materials onsite during projects that use heavy equipment to contain oil, hydraulic fluid, solvents, and hazardous materials spills.

Vegetation

- Implement a noxious weed abatement program. Standard measures include, as appropriate, the following elements: ensure that vehicles and equipment arrive onsite free of mud or seed-bearing material, certify all seeds and straw material as weed-free, identify areas of noxious weeds before dam removal, treat noxious weeds or noxious weed topsoil prior to work (e.g., topsoil segregation and removal), and revegetate with appropriate native species.
- Cover exposed soil with a combination of locally acquired native duff and forest litter from adjacent riparian sites to provide immediate groundcover and facilitate natural revegetation.
- Implement the planting prescriptions prepared for this project.
- Develop and implement a monitoring plan to ensure successful revegetation, maintain plantings, and replace unsuccessful plantings.
- Use native or seed-free mulch to minimize surface erosion and introduction of non-native plants.
- Confine all construction operations to specified project work limits. Install temporary barriers to protect natural surroundings (including trees, plants, and root zones) from damage. Avoid fastening ropes, cables, or fences to trees.
- As much as possible, removed plants and materials (cuttings) shall be salvaged and stored on site for revegetation following dam removal.

Wildlife

- Implement measures to reduce bear/human encounters. Measures include worker education on bear behavior; enforcement of park regulations; and removal of regular trash, all food-related items, and rubbish to bear-proof containers.
- Minimize night lighting during work. Where night lighting is necessary, design lighting to be minimal, directed downward, and shielded.
- Educate workers on the dangers of intentional or unintentional feeding of park wildlife, and on inadvertent harassment through observation or pursuit.

Bird Species

- To avoid conflicts with nesting birds, conduct activities outside the breeding season (typically from March to August).
- Remove trees or structures with unoccupied nests (stick nests or cavities) prior to March 1, or following the nesting season. Alternatively, if activities take place during the breeding season, a qualified biologist shall conduct a pre-work survey for individuals no more than two weeks prior to construction in March through August. If any special-status species is observed nesting, a determination shall be made as to whether or not the proposed action will impact the active nest or disrupt reproductive behavior. If it is determined that the action will not impact an active nest or disrupt breeding behavior, work shall proceed without any restriction or mitigation measure. If it is determined that dam removal activities will impact an active nest or disrupt reproductive behavior, then avoidance strategies shall be implemented. Dam removal activities could be delayed within 500 feet of such a nest until a qualified

biologist determines that the subject birds are not nesting or until any juvenile birds are no longer using the nest as their primary day and night roost.

Mammal Species

- Ensure excavation sites (trenches or pits) have suitable ramps to allow small mammals to exit these areas.
- A qualified biologist shall be available to inspect all excavations before refilling occurs, ensuring that special-status species are passively relocated to avoid incidental take.
- Erect exclosure fencing prior to activities to ensure that no special-status species are within the work area.

Special-Status Species

Special-Status Aquatic Species

Implementation of the following conservation and protection measures would reduce or eliminate potential taking of special-status aquatic species.

- Work activities within potential special-status aquatic species habitat shall be completed during low-flow conditions.
- All work adjacent to or within aquatic habitats shall be regularly monitored.
- All fueling and maintenance of vehicles and equipment shall occur at least 65 feet from any aquatic habitat.
- The total area of activity shall be limited to the minimum necessary to achieve the project goal, as determined collaboratively with contractors and National Park Service staff (including resources management staff).
- During dewatering, intakes shall be completely screened with wire mesh not larger than 5 millimeters to prevent aquatic species from entering the system. Release or pump water downstream at an appropriate rate to maintain downstream flows during work. Upon completion of activities, remove barriers to flow in a manner that allows flow to resume with the least disturbance to the substrate.
- Fence the downstream work boundary to limit the movement of aquatic species into the work area to the actively flowing water area of the channel and to control creek siltation and disturbance to downstream riparian habitat. An exclosure fence shall be installed in the creek channel both upstream and downstream of activities, as appropriate. Install fences at least four weeks prior to the commencement of any activities. Immediately after installation of the exclosure fence, a qualified biologist shall inspect all areas within the fence for aquatic species.

Special-Status Species of Bats

- A qualified biologist shall conduct surveys in the spring and immediately prior to dam removal to determine whether trees or other habitat (e.g., crevices) that would be affected by the proposed action provide hibernacula or nursery colony roosting habitat.
- If special-status species of bats are found breeding within the vicinity of the proposed action, no blasting shall occur between May 1 and September 1.
- If spring surveys reveal that the site is being used as a nursery colony, the action shall not occur until after August 15, when the pups are weaned and are volant.
- If surveys conducted immediately prior to dam removal do not reveal any bat species present within the project area, then the action shall begin within three days to prevent the destruction of any bats that could move into the area after the survey.

- Snags shall not be removed without prior approval from a National Park Service wildlife biologist and/or plant ecologist. Riparian vegetation shall be retained to the extent possible to preserve important foraging habitat.

Air Quality

- Implement a dust abatement program. Contractors shall implement the following measures:
  - Water all active work areas, access roads and paths, parking areas, and staging areas at least twice daily (use of dust abatement products would not be allowed). Ensure that applied water does not enter the Merced River.
  - Cover all trucks hauling dam debris and other loose materials that could spill onto paved surfaces, or require all trucks to maintain adequate freeboard.
  - All paved areas that are subject to vehicle and pedestrian traffic shall be kept clean of debris and soils. Sweeping of these areas shall be implemented as necessary.
  - Cover all stockpiles.
  - Limit traffic speeds on unpaved roads and paths and around the project site.
- Implement vehicle emissions controls. Contractors shall implement the following measures:
  - Use California on-road diesel fuel for all diesel-powered equipment.
  - Use equipment that is properly tuned and maintained in accordance with manufacturers' specifications.
  - Avoid unnecessary emissions. Engines of trucks and vehicles in loading and unloading areas shall be turned off when not in use.

Comparison of Alternatives

This section compares the key features of each of the alternatives and summarizes the potential impacts. Table II-1 shows the comparison of key features, and table II-2 displays potential impacts summarized from Chapter IV, Environmental Consequences. The three alternatives presented in this document represent a reasonable range of options for Cascades Diversion Dam. Under the No Action Alternative, existing conditions and management practices would continue for Cascades Diversion Dam.

Summary of Environmental Consequences

Table II-2 summarizes the key impacts that could result from each of the alternatives, including the No Action Alternative. Detailed descriptions of these impacts are provided in Chapter IV, Environmental Consequences.

TABLE II-1
Summary Comparison of Key Features of the Alternatives

Key Features	Alternatives		
	Alternative 1: No Action	Alternative 2: Complete Dam Removal	Alternative 3: Partial Dam Removal
Estimated cost	Continue existing repairs[a]	$2 to $2.6 million	$2 to $2.6 million
Estimated total duration of removal	0	5 months	5 months
Estimated duration of in-channel removal	0	2 to 3 months	2 to 3 months
Estimated total volume of dam materials (rock, concrete, and timber) removed from the site	0	up to 5,160 cubic yards	up to 5,050 cubic yards
Estimate total volume of sediment excavated (including rock/boulders)	0	4,400 to 5,400 cubic yards	4,400 to 5,400 cubic yards
Estimated total volume of material reconfigured onsite	0	3,000 cubic yards of sediment and 1,500 cubic yards river rock	3,000 cubic yards of sediment and 1,500 cubic yards river rock
Estimated total volume of materials deposited downstream	Up to 20,000 to 25,000 cubic yards of dam-related debris, rock and sediment (includes rocks/boulders)	9,600 to 15,600 cubic yards of sediment (includes rocks/boulders)	9,600 to 15,600 cubic yards of sediment (includes rocks/boulders)
Estimated total thickness of sediment deposited in the vicinity of Cascades Picnic Area	0.4 to 2.7 feet	0.3 to 2.1 feet	0.3 to 2.1 feet
Estimated number of loaded truck trips	--[a]	260	255
Site restoration and stabilization	No	Yes	Yes
Materials recycled	No	Yes	Yes

[a] The cost and number of truck trips associated with removal of dam debris from the river due to continued deterioration and eventual failure.

Table II-2
Summary of Environmental Consequences

Alternative 1 No Action	**Alternative 2** Complete Dam Removal	**Alternative 3** Partial Dam Removal
NATURAL RESOURCES		
GEOLOGY, GEOLOGIC HAZARDS, AND SOILS		
Continued degradation and eventual failure of the dam and retrieval of dam debris would cause bank destabilization, erosion, and soil loss, resulting in local, short- and long-term, moderate, adverse impacts to soil resources. Under Alternative 1, rockfall events would result in a local, long-term, minor, adverse effect on public health and safety.	Dam removal would result in a short-term impact to soils as a result of ground disturbance activities. However, dam removal activities would occur in a controlled manner, with the application of best management practices. Since Alternative 2 would avoid the more extensive adverse effects described under Alternative 1 (i.e., bank destabilization, erosion, and soil compaction and loss due to uncontrolled dam failure and debris retrieval activities), Alternative 2 would have a local, short-term, minor, beneficial effect on soil resources compared to Alternative 1. Site restoration and stabilization would reduce the potential for erosion and sedimentation, help stabilize channel shape and slopes, repair banks, and increase the protection of riverbanks, the adjacent roadway, and utility lines under El Portal Road, resulting in a local, long-term, moderate, beneficial impact on soils. Compared to Alternative 1, Alternative 2 would result in a local, long-term, minor, beneficial effect on public health and safety with respect to geologic hazards.	Dam removal would have a short-term impact to soils as a result of ground disturbance activities. However, dam removal activities would occur in a controlled manner, with the application of best management practices. Since Alternative 3 would avoid the more extensive adverse effects of bank destabilization, erosion, and soil compaction and loss due to uncontrolled dam failure and debris retrieval activities described under Alternative 1, Alternative 3 would have a local, short-term, minor, beneficial effect on soil resources compared to Alternative 1. Site restoration and stabilization would reduce the potential for erosion and sedimentation, help stabilize channel shape and slopes, repair banks, and increase the protection of riverbanks, the adjacent roadway, and utility lines under El Portal Road, resulting in a local, long-term, moderate, beneficial impact on soils. Compared to Alternative 1, retention of the intake structure as a viewing platform would result in a local, long-term, negligible, adverse impact to public health and safety, due to potential damage to the viewing platform from geologic hazards.
The cumulative projects would result in a local, long-term, minor, beneficial cumulative impact on soil resources. Alternative 1 and the cumulative projects would result in a local, long-term, minor, beneficial impact to public safety in the project region, due to the overall reduction in the density of facilities in the talus slope and rockfall shadow zones. The local, long-term, minor, beneficial impact to soil resources under the cumulative projects would be somewhat diminished by the potential soil erosion and bank destabilization under Alternative 1, resulting in a net local, long-term, negligible, beneficial impact to soil resources.	Past, present, and reasonably foreseeable future actions would result in a long-term, minor, beneficial cumulative impact to soil resources and to public health and safety with respect to geologic hazards. Alternative 2 and the cumulative projects would result in a local, long-term, minor, beneficial impact to soil resources and public safety with respect to geologic hazards. Alternative 2 would avoid the more extensive adverse effects of soil erosion and bank destabilization compared to Alternative 1. Overall, the cumulative projects would restore soils in the project region, reduce soil degradation, and decrease the density of people and facilities in the talus slope zone.	Past, present, and reasonably foreseeable future actions would result in a long-term, minor, beneficial cumulative impact to soil resources and to public health and safety with respect to geologic hazards. Overall, the cumulative projects would restore soils in the project region, reduce soil degradation, and decrease the density of people and facilities in the talus slope zone. Alternative 3 and the cumulative projects would result in a local, long-term, minor, beneficial impact to soil resources and public safety with respect to geologic hazards. Alternative 3 would avoid the more extensive adverse effects of soil erosion and bank destabilization that would occur under Alternative 1.
HYDROLOGY, FLOODPLAINS, AND WATER QUALITY		
Alternative 1 would have local, short-term, moderate, adverse impacts on hydrologic processes and water quality, due to continued deterioration and eventual failure of the dam and subsequent debris retrieval activities. Over the long term, the failed dam would be removed and more natural river hydrology would be restored in this area, which would have a local, long-term, moderate, beneficial impact on hydrologic processes.	Dam removal would have a short-term water quality impact related to the discharge of petroleum components. However, dam removal activities would occur in a controlled manner, with the application of best management practices. Compared to Alternative 1, Alternative 2 would have local, short- and long-term, minor to moderate, beneficial impact on hydrologic processes and water quality by avoiding bank erosion and localized flooding associated with continued deterioration and eventual dam failure, reducing sedimentation, and controlling removal of the dam.	Dam removal would have a short-term water quality impact related to the discharge of petroleum components. However, dam removal activities would occur in a controlled manner, with the application of best management practices. Compared to Alternative 1, Alternative 3 would have a local, short- and long-term, minor to moderate, beneficial impact on hydrologic processes and water quality by avoiding bank erosion and localized flooding associated with continued deterioration and eventual dam failure, reducing sedimentation, and controlling removal of the dam.

Table II-2 (Continued)
Summary of Environmental Consequences

Alternative 1 No Action	**Alternative 2** Complete Dam Removal	**Alternative 3** Partial Dam Removal
HYDROLOGY, FLOODPLAINS, AND WATER QUALITY (continued)		
Overall, the cumulative projects would result in a local, long-term, minor, beneficial impact to hydrologic processes and water quality. The past, present, and future projects in the Merced River watershed, considered cumulatively with Alternative 1, would have a local, long-term, minor, beneficial impact to hydrologic processes and water quality. The long-term beneficial effects associated with dam failure under Alternative 1 would contribute to the beneficial cumulative effects, and largely offset the short-term adverse effects associated with the continued deterioration and eventual failure of the dam.	The cumulative projects would result in an overall local, long-term, minor, beneficial impact to hydrologic processes and water quality. The past, present, and reasonably foreseeable future projects considered cumulatively with Alternative 2 would result in a local, long-term, minor, beneficial impact on hydrologic processes. The beneficial impacts associated with Alternative 2 would nominally contribute to overall beneficial cumulative impacts on hydrologic processes and water quality.	The cumulative projects would result in an overall local, long-term, minor, beneficial impact to hydrologic processes and water quality. The past, present, and reasonably foreseeable future projects considered cumulatively with Alternative 3 would have a local, long-term, minor, beneficial impact on hydrologic processes. The beneficial impact associated with Alternative 3 would nominally contribute to the overall beneficial cumulative impact on hydrologic processes and water quality.
WETLANDS		
In the near term, Cascades Diversion Dam would remain and would continue to adversely affect the size, connectivity, and integrity of wetlands in the immediate vicinity of the dam, particularly palustrine forest and riverine habitats. Cascades Diversion Dam would degrade and eventually fail. Dam materials and impounded sediments would be released downstream and could affect riparian and aquatic resources during transport (e.g., large dam debris could remove riparian trees), upon deposition, or during debris retrieval activities, resulting in a local, short-term, negligible to minor, adverse impact to wetland resources. Although natural stabilization of the riparian and aquatic community would occur over time, restoration would not be complete for 10 or more years; therefore, this impact is considered a local, long-term, minor to moderate, adverse effect on wetland and aquatic habitats.	Dam removal activities would have a short-term impact to wetland and aquatic habitat resources associated with ground disturbance and the potential introduction of pollutants. However, dam removal activities would occur in a controlled manner, with the application of mitigation, reducing the adverse effect to a negligible intensity. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on wetland and aquatic habitat compared to Alternative 1. Removal of Cascades Diversion Dam would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing its biological integrity. Alternative 2 would result in a local, long-term, moderate, beneficial effect on wetland and aquatic resources compared to Alternative 1.	Dam removal activities would have a short-term impact to wetland and aquatic habitat resources associated with ground disturbance and the potential introduction of pollutants. However, dam removal activities would occur in a controlled manner, with the application of mitigation, reducing the adverse effect to a negligible intensity. Therefore, Alternative 3 would have a local, short-term, negligible, beneficial effect on wetland and aquatic habitat compared to Alternative 1. Removal of the overflow portion of Cascades Diversion Dam and the river-left abutment would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing its biological integrity. Alternative 3 would result in a local, long-term, minor to moderate, beneficial effect on wetland and aquatic resources compared to Alternative 1.
Overall, the cumulative projects would increase the size, connectivity, and integrity of wetland resources within the watershed, resulting in a long-term, major, beneficial cumulative effect on wetland and aquatic resources. Although Alternative 1 would have a local, short-term, negligible to minor, adverse effect and a local, long-term, minor to moderate, adverse effect on wetland and aquatic habitats in the vicinity of the dam, the cumulative projects would overshadow the effects of Alternative 1, resulting in a net long-term, major, beneficial effect on wetland patterns within the Merced River corridor.	Overall, the cumulative projects would increase the size, connectivity, and integrity of wetland resources within the watershed, resulting in a long-term, major, beneficial cumulative effect on wetland and aquatic resources. Past, present, and reasonably foreseeable future projects in combination with Alternative 2 would have a net long-term, major, beneficial effect on wetland patterns within the Merced River corridor.	Overall, the cumulative projects would increase the size, connectivity, and integrity of wetland resources within the watershed, resulting in a long-term, major, beneficial cumulative effect on wetland and aquatic resources. Past, present, and reasonably foreseeable future projects in combination with Alternative 3 would have a net long-term, major, beneficial effect on wetland patterns within the Merced River corridor.

Table II-2 (Continued)
Summary of Environmental Consequences

Alternative 1 No Action	**Alternative 2** Complete Dam Removal	**Alternative 3** Partial Dam Removal
VEGETATION		
In the near term, Cascades Diversion Dam would remain and would continue to adversely affect the size, connectivity, and integrity of vegetation in the immediate vicinity of the dam, particularly palustrine forest and riverine habitats. Cascades Diversion Dam would degrade and eventually fail. Dam materials and impounded sediments would be released downstream and could affect downstream vegetation, especially riparian vegetation, during transport (e.g., large dam debris could remove riparian trees), upon deposition, or during debris retrieval activities, resulting in a local, short-term, negligible to moderate, adverse impact to vegetation. Although natural stabilization of river-associated vegetation would occur over time, restoration would not be complete for 10 or more years; therefore, this impact is considered a local, long-term, minor, adverse effect on vegetation.	Dam removal activities would have a short-term impact to vegetation associated with ground disturbance and the potential introduction of pollutants. However, dam removal activities would occur in a controlled manner, with the application of mitigation, reducing the adverse effect to a negligible intensity. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on vegetation compared to Alternative 1. Removal of Cascades Diversion Dam would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing its biological integrity. The re-establishment of the riparian corridor along this portion of the river would have a local, long-term, minor to moderate, beneficial effect on streamside vegetation in the vicinity of Cascades Diversion Dam compared to Alternative 1.	Dam removal activities would have a short-term impact to vegetation associated with ground disturbance and the potential introduction of pollutants. However, dam removal activities would occur in a controlled manner, with the application of mitigation, reducing the adverse effect to a negligible intensity. Therefore, Alternative 3 would have a local, short-term, negligible, beneficial effect on vegetation compared to Alternative 1. Removal of the overflow portion of Cascades Diversion Dam and the river-left abutment would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing its biological integrity. Alternative 3 would result in a local, long-term, minor to moderate, beneficial effect on vegetation compared to Alternative 1.
Overall, the cumulative projects would increase the size, connectivity, and integrity of vegetation within the watershed, resulting in a long-term, major, beneficial cumulative effect on vegetation. Although Alternative 1 would have a local, short-term, negligible to moderate, adverse effect and a local, long-term, minor, adverse effect on vegetation, the cumulative projects would overshadow the effects of Alternative 1, resulting in a net long-term, major, beneficial effect on vegetation patterns within the Merced River corridor.	Overall, the cumulative projects would increase the size, connectivity, and integrity of vegetation within the watershed, resulting in a long-term, major, beneficial cumulative effect on vegetation. Past, present, and reasonably foreseeable future projects in combination with Alternative 2 would have a net long-term, major, beneficial effect on vegetation patterns within the Merced River corridor.	Overall, the cumulative projects would increase the size, connectivity, and integrity of vegetation within the watershed, resulting in a long-term, major, beneficial cumulative effect on vegetation. Past, present, and reasonably foreseeable future projects in combination with Alternative 3 would have a net long-term, major, beneficial effect on vegetation patterns within the Merced River corridor.
WILDLIFE		
In the near term, Cascades Diversion Dam would remain and would continue to adversely affect the size, connectivity, and integrity of wildlife and aquatic habitat in the immediate vicinity of the dam. Cascades Diversion Dam would degrade and eventually fail. Dam materials and impounded sediments would be released downstream and could have both beneficial and adverse affects on aquatic wildlife resources. Bank erosion and dam retrieval activities could result in a local, short-term, negligible to moderate, adverse impact on wildlife. Although natural stabilization of the riparian and aquatic community would occur over time, restoration would not be complete for 10 or more years; therefore, this impact is considered a long-term effect. Overall, Alternative 1 would result in a local, long-term, minor to moderate, adverse impact to aquatic wildlife habitat and associated native fish and wildlife.	Dam removal activities would have a short-term impact to wildlife associated with ground disturbance and the potential introduction of pollutants. However, dam removal activities would occur in a controlled manner, with the application of mitigation, reducing the adverse effect to a negligible intensity. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on wildlife compared to Alternative 1. Removal of Cascades Diversion Dam would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing the biological integrity of this segment for native fish and wildlife. The re-establishment of the riparian corridor along this portion of the river would have a local, long-term, minor to moderate, beneficial effect on fish and wildlife habitat in the vicinity of Cascades Diversion Dam compared to Alternative 1.	Same as Alternative 2

Table II-2 (Continued)
Summary of Environmental Consequences

Alternative 1 No Action	**Alternative 2** Complete Dam Removal	**Alternative 3** Partial Dam Removal
WILDLIFE (continued)		
Overall, the cumulative projects would increase the size, connectivity, and integrity of native fish and wildlife habitat within the watershed, resulting in a long-term, minor to moderate, beneficial cumulative effect for wildlife. Therefore, past, present, and reasonably foreseeable future actions, in combination with Alternative 1, would have a net long-term, minor to moderate, beneficial effect on native fish and wildlife within the Merced River corridor.	Overall, the cumulative projects would increase the size, connectivity, and integrity of native fish and wildlife habitat within the watershed, resulting in a long-term, minor to moderate, beneficial cumulative effect for wildlife. Past, present, and reasonably foreseeable future projects in combination with Alternative 2 would have a net long-term, minor to moderate, beneficial effect on fish and wildlife patterns within the Merced River corridor.	Same as Alternative 2
SPECIAL-STATUS SPECIES		
In the near term, Cascades Diversion Dam would remain and would continue to adversely affect the size, connectivity, and integrity of habitat for Wawona riffle beetle and harlequin duck in the immediate vicinity of the dam, resulting in a continued minor to moderate, adverse impact on beetles and their habitat. Cascades Diversion Dam would degrade and eventually fail, creating a local, short-term, moderate, adverse impact on individuals or habitat for Wawona riffle beetle and harlequin duck that occur downstream of the dam. In the impoundment area, eventual dam failure would return this area to a more natural condition, creating an overall local, long-term, minor to moderate, beneficial effect on Wawona riffle beetle and harlequin duck by increasing habitat for the species. Alternative 1 is unlikely to significantly affect special-status species of bats or the California spotted owl in the vicinity of Cascades Diversion Dam.	Dam removal activities would have a short-term impact to special-status species associated with ground disturbance and the potential introduction of pollutants. However, dam removal activities would occur in a controlled manner, with the application of mitigation, reducing the adverse effect to a negligible intensity. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on special-status species compared to Alternative 1. Removal of Cascades Diversion Dam and revegetation would restore the free-flowing condition of the Merced River and return this portion of the river to a more natural state, thereby enhancing the biological integrity of this segment for Wawona rifle beetle and harlequin duck, resulting in a local, long-term, minor, beneficial effect on habitat for Wawona riffle beetle and harlequin duck at this location. The bioengineered bank stabilization and revegetation would have a local, long-term, negligible to minor, beneficial effect on habitat for special-status bats and California spotted owl at this location.	Same as Alternative 2
Full implementation of cumulative projects planned or approved within the watershed would have a long-term, moderate, beneficial cumulative effect on habitat for special-status species by enhancing habitat connectivity, size, and structure within Yosemite Valley and throughout the Merced River corridor. Therefore, past, present, and reasonably foreseeable future actions in combination with Alternative 1 could have a net long-term, moderate, beneficial effect on special-status species within the corridor of the Merced River.	Full implementation of cumulative projects planned or approved within the watershed would have a long-term, moderate, beneficial cumulative effect on habitat for special-status species by enhancing habitat connectivity, size, and structure within Yosemite Valley and throughout the Merced River corridor. Past, present, and reasonably foreseeable future projects in combination with Alternative 2 would have a net long-term, moderate, beneficial effect on habitat for special-status species within the Merced River corridor.	Same as Alternative 2

Table II-2 (Continued)
Summary of Environmental Consequences

Alternative 1 No Action	**Alternative 2** Complete Dam Removal	**Alternative 3** Partial Dam Removal
AIR QUALITY		
Emissions associated with maintenance activities prior to dam failure and debris removal after dam failure under Alternative 1 would result in a local, short-term, negligible to moderate, adverse impact to air quality. There would be no long-term impact on air quality under Alternative 1.	Dam removal activities would result in a short-term air quality impact associated with vehicle emissions. Because dam removal and sediment excavation would occur in a controlled manner and would include the application of best management practices, Alternative 2 would avoid the more extensive adverse effects of debris retrieval activities on air quality described under Alternative 1. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on air quality compared to Alternative 1. Alternative 2 would not result in a long-term impact to air quality.	Same as Alternative 2
The cumulative projects would have a local, long-term, minor, beneficial effect on air quality in the Merced River corridor. Alternative 1 and the cumulative projects would have a local, long-term, minor, beneficial impact on air quality. Alternative 1 would reduce the intensity of this beneficial impact to negligible in the short term, due to emissions that would be generated during maintenance activities and debris removal after dam failure.	Cumulative actions would have a local, long-term, minor, beneficial impact on air quality. Alternative 2 and the cumulative projects would result in a local, long-term, minor, beneficial impact on air quality. Dam removal under Alternative 2, as compared to Alternative 1, would contribute to beneficial impacts on air quality in the short term.	Same as Alternative 2
NOISE		
Noise generated by routine maintenance and debris removal activities under Alternative 1 would result in a local, short-term, negligible to moderate, adverse impact to the ambient noise environment. There would be no long-term impact on the noise environment under Alternative 1.	Dam removal activities would result in short-term noise impacts associated with equipment operation. Because dam removal would occur in a controlled manner and would include the application of best management practices, Alternative 2 would avoid the more extensive adverse effects of noise generated by debris retrieval activities on the ambient noise environment described under Alternative 1. Therefore, Alternative 2 would have a local, short-term, negligible, beneficial effect on the ambient noise environment compared to Alternative 1.	Same as Alternative 2
Over the long term, the cumulative projects would result in a net local, long-term, minor, adverse effect on the noise environment. Alternative 1 would contribute to this cumulative impact in the short term.	The cumulative actions would result in a local, long-term, minor, adverse effect on the noise environment. The local, short-term, negligible, beneficial effect under Alternative 2 would not improve this cumulative effect and, overall, Alternative 2 and the cumulative projects would result in a local, long-term, minor, adverse effect on the noise environment.	Same as Alternative 2

Table II-2 (Continued)
Summary of Environmental Consequences

Alternative 1 No Action	**Alternative 2** Complete Dam Removal	**Alternative 3** Partial Dam Removal
	CULTURAL RESOURCES	
	ARCHEOLOGICAL RESOURCES	
There would be no change in the treatment and management of archeological resources as a result of Alternative 1. Dam failure and subsequent bank erosion could have a long-term adverse effect on archeological resources in the vicinity of the dam downstream to Cascades Picnic Area. Any site-specific planning and compliance actions would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement. Overall, Alternative 1 would result in a local, long-term, minor to moderate, adverse impact to archeological resources.	Ground-disturbing activities under Alternative 2 could have a local, long-term, minor, adverse impact to as-yet unknown archeological resources. Any actions would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement.	Same as Alternative 2
The cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, negligible to minor, adverse impact on archeological resources, due to the potential disturbance of such resources. Alternative 1 and the cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, negligible to minor, adverse impact on archeological resources.	The cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, negligible to minor, adverse impact on archeological resources, due to the potential disturbance of such resources. Alternative 2 and the cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, negligible to minor, adverse impact on archeological resources.	Same as Alternative 2
	ETHNOGRAPHIC RESOURCES	
There would be no change in the treatment and management of ethnographic resources as a result of Alternative 1. Dam failure and subsequent bank erosion could have a long-term adverse effect on ethnographic resources in the vicinity of the dam downstream to Cascades Picnic Area. Any actions taken by the National Park Service would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement, and the park would continue to consult with culturally associated American Indian tribes under this Programmatic Agreement and the cooperative agreement for traditional uses. Overall, Alternative 1 would result in a local, long-term, minor to moderate, adverse impact to ethnographic resources	Ground-disturbing activities under Alternative 2 could affect ethnographic resources. Any actions would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement, such as disturbance avoidance or culturally sensitive design measures. In addition, the park would continue to consult with culturally associated American Indian tribes under this Programmatic Agreement and the cooperative agreement for traditional uses. Therefore, Alternative 2 would result in a local, short-term, negligible, adverse impact to ethnographic resources.	Same as Alternative 2
The cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, minor, adverse impact on ethnographic resources due to the disturbance of such resources. Alternative 1 and the cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, minor, adverse impact on ethnographic resources.	The cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, minor, adverse impact on ethnographic resources due to the disturbance of such resources. Alternative 2 and the cumulative projects within and in the vicinity of the main stem of the Merced River would result in a local, long-term, minor, adverse impact on ethnographic resources.	Same as Alternative 2

Table II-2 (Continued)
Summary of Environmental Consequences

Alternative 1 No Action	**Alternative 2** Complete Dam Removal	**Alternative 3** Partial Dam Removal
CULTURAL LANDSCAPE RESOURCES, INCLUDING HISTORIC SITES AND STRUCTURES		
Uncontrolled dam failure would result in the loss of the dam, a cultural resource, and could cause damage to downstream elements of the Yosemite Hydroelectric Power Plant, the Merced Canyon Travel Corridor, or the Coulterville Stage Road, thus affecting the cultural landscape. Because demolition, relocation, and/or rehabilitation of all components of the Yosemite Hydroelectric Power Plant have been evaluated and the National Park Service has complied with all stipulation of the 1986 Memorandum of Agreement, and because any actions undertaken by the National Park Service (i.e., debris removal) would be performed in accordance with stipulations in the park's 1999 Programmatic Agreement, the adverse impact would be somewhat reduced to moderate.	Controlled removal of Cascades Diversion Dam under Alternative 2 would be conducted in compliance with stipulations in the park's 1999 Programmatic Agreement, and compliance with the 1986 Memorandum of Agreement is already complete; therefore, Alternative 2 would result in a local, long-term, moderate, adverse impact to the cultural landscape.	Same as Alternative 2
The cumulative projects would result in a local, long-term, minor, adverse impact on the cultural landscape due to the disturbance of cultural landscape resources. Alternative 1 and the cumulative projects would result in a local, long-term, minor, adverse impact on such resources.	The cumulative projects would result in a local, long-term, minor, adverse impact on the cultural landscape due to the disturbance of cultural landscape resources. Alternative 2 and the cumulative projects would result in a local, long-term, minor, adverse impact on such resources.	Same as Alternative 2
SOCIAL RESOURCES		
TRANSPORTATION		
Under Alternative 1, the continued use of the parking area would constitute a local, long-term, minor, beneficial effect on traffic flow. Under Alternative 1, continued use of the parking area by visitors for access to the intake structure would constitute a local, long-term, minor, adverse impact to traffic safety. Maintenance-related activities prior to dam failure under Alternative 1 would result in a local, short-term, negligible, adverse impact to traffic flow. Emergency response and debris removal activities under Alternative 1 would result in a local, short-term, minor to moderate, adverse impact to traffic flow.	Under Alternative 2, avoidance of the traffic conflict to sightseers would result in a local, long-term, minor, beneficial impact compared to Alternative 1. Dam removal activities would result in a short-term increase in vehicle trips in the project area. Controlled dam removal using best management practices under Alternative 2 would have a local, short-term, negligible, beneficial impact on traffic flow compared to Alternative 1.	Under Alternative 3, removal of the parking lot would have a local, long-term, minor, adverse impact on traffic flow. There would be a local, long-term, negligible, beneficial impact associated with traffic conflicts compared to Alternative 1. Dam removal activities would result in a short-term increase in vehicle trips in the project area. Controlled partial dam removal using best management practices under Alternative 3 would have a local, short-term, negligible, beneficial impact on traffic flow compared to Alternative 1.
Collectively, the cumulative projects would have a local, long-term, major, beneficial impact on transportation conditions along the Merced River corridor. Construction activities associated with the development of cumulative projects, however, would reduce the intensity of this beneficial impact to a minor or moderate level in the short term. Alternative 1 and the cumulative projects would result in a local, long-term, moderate, beneficial impact on transportation conditions along the Merced River corridor.	The cumulative projects would have a local, long-term, major, beneficial impact on transportation conditions along the Merced River corridor. Construction activities associated with the development of cumulative projects, however, would reduce the intensity of this beneficial impact to a minor or moderate level in the short term. Alternative 2 and the cumulative projects would result in a local, long-term, major, beneficial impact on transportation conditions along the Merced River corridor. Controlled dam removal under Alternative 2 would contribute to this beneficial impact in the short term, as compared to Alternative 1.	The cumulative projects would have a local, long-term, major, beneficial impact on transportation conditions along the Merced River corridor. Construction activities associated with the development of cumulative projects, however, would reduce the intensity of this beneficial impact to a minor or moderate level in the short term. Alternative 3 and the cumulative projects would result in a local, long-term, major, beneficial impact on transportation conditions along the Merced River corridor. Controlled dam removal under Alternative 3 would contribute to this beneficial impact in the short term, as compared to Alternative 1.

Table II-2 (Continued)
Summary of Environmental Consequences

Alternative 1 No Action	**Alternative 2** Complete Dam Removal	**Alternative 3** Partial Dam Removal
SCENIC RESOURCES		
Alternative 1 would result in a local, short-term, minor, adverse impact to scenic resources within the Merced River corridor downstream to the Cascades Picnic Area. Prior to dam failure, the dam in its deteriorating condition would continue to visually intrude on the scenic character of this area of the river corridor and on views from the Merced River, its banks, and El Portal Road. Dam failure under Alternative 1 would ultimately eliminate a landscape feature that currently contrasts with and detracts somewhat from the scenic resource values of the Merced River. Thus, Alternative 1 would result in a local, long-term, minor, beneficial impact to scenic resources in this portion of the Merced River corridor.	In avoiding the effects associated with uncontrolled dam deterioration and eventual failure, which include deposition of debris in the river channel and visually prominent damage to the riverbanks and vegetation, Alternative 2 would have a local, short-term, minor, beneficial impact on scenic resources. The long-term effects of dam removal would be beneficial under both Alternative 1 and Alternative 2. However, due to the bank stabilization and restoration efforts included, Alternative 2 would result in a local, long-term, minor, beneficial impact to scenic resources compared to Alternative 1.	In avoiding the effects associated with uncontrolled dam deterioration and eventual failure, which include deposition of debris in the river channel and visually prominent damage to the riverbanks and vegetation, Alternative 3 would have a local, short-term, minor, beneficial impact on scenic resources. The long-term effects of dam removal would be beneficial under both Alternative 1 and Alternative 3. However, due to the bank stabilization and restoration efforts included, Alternative 3 would result in a local, long-term, minor, beneficial impact to scenic resources compared to Alternative 1.
The cumulative projects within and in the vicinity of the Merced River corridor would result in a local, long-term, major, beneficial cumulative impact on scenic resources along the Merced River corridor because of the overall emphasis of these projects on restoring disturbed or developed land to natural conditions and improving the health of ecosystems. Alternative 1 and the cumulative projects within the Merced River corridor would result in a local, long-term, major, beneficial impact on scenic resources in the Merced River corridor, due to the overall emphasis on restoring disturbed or developed land to natural conditions, improving the health of ecosystems, and eliminating Cascades Diversion Dam. These beneficial effects would outweigh the short-term adverse effect associated with Alternative 1 and the cumulative development-related projects.	The cumulative projects within and in the vicinity of the Merced River corridor would result in a local, long-term, major, beneficial impact on scenic resources along the Merced River corridor because of the overall emphasis on restoring disturbed or developed land to natural conditions and improving the health of ecosystems. Alternative 2 and the cumulative projects within the Merced River corridor would result in a local, long-term, major, beneficial impact on scenic resources in the Merced River corridor.	The cumulative projects within and in the vicinity of the Merced River corridor would result in a local, long-term, major, beneficial impact on scenic resources along the Merced River corridor because of the overall emphasis on restoring disturbed or developed land to natural conditions and improving the health of ecosystems. Alternative 3 and the cumulative projects within the Merced River corridor would result in a local, long-term, major, beneficial impact on scenic resources in the Merced River corridor.
RECREATION		
The potential for injury and/or fatality due to pedestrian hazards on El Portal Road and to falls from the dam structure would constitute a local, short-term, moderate, adverse impact to active recreational activities in the immediate vicinity of the dam. The potential for injury and/or fatalities in the event of dam failure would constitute a local, short-term, moderate, adverse impact to active recreational activities in the immediate vicinity of the dam as well as downstream to Cascades Picnic Area. The effects of dam failure on water quality and flows would result in a local, short-term, moderate, adverse impact to active recreation downstream from the dam to the Cascades Picnic Area. Temporary obstruction and/or closure of existing roads, parking areas, and trails from the dam area to Cascades Picnic Area and associated delays during cleanup operations after dam failure would result in a local, short-term, minor, adverse effect on recreational access in this reach. Over the long term, no impacts on recreational resources would be expected.	Compared to Alternative 1, elimination of the potential for injury and/or fatality to river-related recreation users under Alternative 2 would be a local, short-term, moderate, beneficial impact on recreation; a local, short-term, minor, beneficial impact on river-dependent recreation; and a local, short-term, negligible to minor, beneficial effect on recreational access.	Elimination of the potential for injury and/or fatality to river-related recreation users would be a local, short-term, moderate, beneficial impact on recreation; a local, short-term, minor, beneficial impact on river-dependent recreation; and a local, short-term, negligible to minor, beneficial effect on recreational access. Compared to Alternative 1, Alternative 3 would result in a local, long-term, negligible to minor, adverse effect on recreational access associated with the permanent removal of the parking area in the Cascades Diversion Dam vicinity.

Table II-2 (Continued)
Summary of Environmental Consequences

Alternative 1 No Action	**Alternative 2** Complete Dam Removal	**Alternative 3** Partial Dam Removal
RECREATION (continued)		
The cumulative projects would have a local, long-term, moderate, beneficial effect on recreation due to expanded recreational opportunities in the Merced River corridor and improved transit service to more park destinations. Alternative 1 and the cumulative projects in the Merced River corridor would result in a local, long-term, moderate, beneficial impact on recreation due to expanded recreational opportunities in the Merced River corridor and improved transit service to more park destinations. The local, short-term, minor to moderate, adverse impact on river-related recreational activities resulting from dam failure would be offset by the beneficial impacts of the cumulative projects.	The cumulative projects would have a local, long-term, moderate, beneficial effect on recreation due to expanded recreational opportunities in the Merced River corridor and improved transit service to more park destinations. Alternative 2 and the cumulative projects in the Merced River corridor would result in a local, long-term, moderate, beneficial impact on recreation due to expanded recreational opportunities in the Merced River corridor and improved transit service to more park destinations.	The cumulative projects would have a local, long-term, moderate, beneficial effect on recreation due to expanded recreational opportunities in the Merced River corridor and improved transit service to more park destinations. Alternative 3 and the cumulative projects in the Merced River corridor would result in a local, long-term, moderate, beneficial impact on recreation due to expanded recreational opportunities in the Merced River corridor. The local, long-term, negligible to minor, adverse effect on recreational access associated with the permanent removal of the parking area near Cascades Diversion Dam would be offset by the beneficial impact of the cumulative projects.
ORIENTATION AND INTERPRETATION		
Dam failure under Alternative 1 could affect orientation and interpretation opportunities, resulting in a local, short-term, negligible to minor, adverse impact to orientation (i.e., roadside signs) and interpretation opportunities downstream from the dam to the Cascades Picnic Area.	Under Alternative 2, the inclusion of interpretation opportunities during dam removal activities and avoidance of the potential for dam debris and erosion to affect downstream orientation and interpretation opportunities would be a local, short-term, minor, beneficial impact on orientation and interpretation compared to Alternative 1.	Under Alternative 3, the inclusion of interpretation opportunities during dam removal activities and avoidance of the potential for dam debris and erosion to affect downstream orientation and interpretation opportunities would be a local, short-term, minor, beneficial impact on orientation and interpretation compared to Alternative 1. Because Alternative 3 would include interpretive displays in the project area and Alternative 1 would have no long-term effect, Alternative 3 would result in a local, long-term, minor, beneficial impact to orientation and interpretation opportunities compared to Alternative 1.
The cumulative projects would have a local, long-term, minor, beneficial effect due to expanded orientation and interpretation opportunities in the Merced River corridor. Alternative 1 and the cumulative projects in the Merced River corridor would result in a local, long-term, minor, beneficial impact due to expanded orientation and interpretation opportunities in the Merced River corridor. The local, short-term, negligible to minor, adverse impact on orientation and interpretation opportunities resulting from dam failure would be offset by the beneficial impact of the cumulative projects.	The cumulative projects would have a local, long-term, minor, beneficial effect due to expanded orientation and interpretation opportunities in the Merced River corridor. Alternative 2 and the cumulative projects in the Merced River corridor would result in a local, long-term, minor, beneficial impact due to expanded orientation and interpretation opportunities in the Merced River corridor.	The cumulative projects would have a local, long-term, minor, beneficial effect due to expanded orientation and interpretation opportunities in the Merced River corridor. Alternative 3 and the cumulative projects in the Merced River corridor would result in a local, long-term, minor, beneficial impact due to expanded orientation and interpretation opportunities in the Merced River corridor.

Table II-2 (Continued)
Summary of Environmental Consequences

Alternative 1 No Action	**Alternative 2** Complete Dam Removal	**Alternative 3** Partial Dam Removal
SOCIOECONOMICS		
Due to the uncertainty regarding the magnitude and timing of project-related equipment spending associated with potential dam failure, economic impacts cannot be definitively projected. Given currently available information, however, it is expected that Alternative 1 would have a regional, short-term, negligible, beneficial impact on the socioeconomy due to the temporary nature of the dam debris removal activity and the small magnitude of spending for debris removal compared with the size of the construction industry in the affected region.	Alternative 2 would have a direct economic impact of $1.9 to $2.5 million and an indirect and induced impact of $0.9 to $1.1 million, which would result in a short-term, negligible, beneficial impact on the regional economy.	Same as Alternative 2
The cumulative projects within and in the vicinity of Yosemite National Park would result in a local, long-term, negligible, beneficial impact to the regional economy, and a local, short-term, major, beneficial impact during construction. Alternative 1 would contribute to this effect.	The cumulative projects within and in the vicinity of Yosemite National Park would result in a local, long-term, negligible, beneficial impact to the regional economy, and a local, short-term, major, beneficial impact during construction. Alternative 2 would contribute to this local, short-term, beneficial impact due to temporary spending on dam removal activities.	Same as Alternative 2
PARK OPERATIONS		
Dam failure could result in a short-term (immediate) and dramatic increase in demand for the full range of park operations and emergency response staff to respond to evacuation and medical emergencies, remove dam debris, and repair damaged facilities downstream from the dam to the Cascades Picnic Area, a local, short-term, moderate to major, adverse impact. In addition, uncontrolled failure of the dam could damage the wastewater line and electrical conductors for Yosemite Valley. This would have a local, long-term, moderate to major, adverse effect on park facilities, depending on the nature and extent of damages. Under Alternative 1, continued use of the parking area and public telephone would constitute a local, long-term, minor, beneficial impact to park operations.	Alternative 2 would avoid potential catastrophic damage to park facilities, resulting in a local, long-term, minor, beneficial impact compared to Alternative 1. Dam removal activities could result in damage to park facilities. Controlled dam removal under this alternative, with the application of mitigation measures, would have a local, short-term, minor, beneficial impact on park operations, due to the reduced demands on park operations staff compared to Alternative 1, which would require an emergency response to dam failure and damaged facilities.	Alternative 3 would result in a local, long-term, minor, beneficial impacts on park facilities because of the avoidance of potential catastrophic damage to park facilities compared to Alternative 1. Dam removal activities could result in damage to park facilities. Controlled dam removal under this alternative, with the application of mitigation measures, would have a local, short-term, minor, beneficial impact on park operations due to the reduced demands on park operations staff compared to Alternative 1, which would require an emergency response to manage dam failure and repair potentially damaged facilities. Long-term minor repairs to the river-viewing platform under Alternative 3 would result in a local, long-term, minor, adverse impact to park operations compared to Alternative 1.
Overall, the past, present, and reasonably foreseeable future actions would have a local, moderate, adverse cumulative impact because of the increased demand on park operations, services, and facilities, over both the short and long term. These cumulative effects, in combination with Alternative 1, would result in a local, short- and long-term, moderate to major, adverse impact on park operations and facilities, depending upon the nature and extent of damage to facilities.	Overall, the past, present, and reasonably foreseeable future actions would have a local, moderate, adverse cumulative impact because of the increased demand on park operations, services, and facilities, over both the short and long term. These cumulative effects, in combination with Alternative 2, would result in a local, short- and long-term, moderate, adverse impact on park operations and facilities, due to the increased demand these projects would place on park operations, services, and facilities. The minor beneficial effects under Alternative 2 would not offset the adverse effects associated with the cumulative projects.	Overall, the past, present, and reasonably foreseeable future actions would have a local, moderate, adverse cumulative impact because of the increased demand on park operations, services, and facilities, over both the short and long term. These cumulative effects, in combination with Alternative 3, would result in a local, short- and long-term, moderate, adverse impact on park operations and facilities, due to the increased demand these projects would place on park operations, services, and facilities. The minor beneficial effects under Alternative 3 would not offset the adverse effects associated with the cumulative projects.